

REMARKS

Claims 1-26 have been canceled without prejudice or disclaimer. Applicants reserve the right to file one or more continuation or divisional applications directed to the canceled subject matter. New claims 27-51 have been added. Claims 27-32 correspond to canceled claims 1-6, respectively; new claim 33 corresponds to canceled claim 7. Canceled claim 7 was deemed to be allowable if written in independent form, new claim 33 is canceled 7 written in independent form as required by the Office. New claims 34-37 correspond to canceled claims 8-11, respectively. Claim 11 was stated to be allowable if rewritten in independent form. However, claim 11 was rejected under 35 USC 103(a) in the official Office action-see page 2. New claim 38 corresponds to canceled claim 12. After careful review of the Official Office action, it appears that the Office did not reject claim 12 so claim 12 has been written in independent form as new claim 38 in order to put it in condition for allowance. New claims 39 and 40 correspond to canceled claims 13 and 14. New claims 41 and 42, written in independent form, correspond to canceled claims 15 and 16 which the office deemed allowable if written in independent form. New claim 43 corresponds to

canceled claims 17 and 18 and is an independent claim. The Office only rejected canceled claims 17 and 18 under 35 USC 112, second paragraph. The claims have been amended to overcome the failure to provide antecedent basis. Therefore new claim 43 is condition for allowance. New claims 44 and 45, corresponding to canceled claims 19 and 20, respectively, depend from new claim 43 and should also be in condition for allowance. New claims 46-51 correspond to canceled claims 21-26. Basis for the recitation "having reduced levels of suspended solids..." in claims 27-31 can be found, for example, in paragraph number [0051]. Basis for the amendment to claims 27-28, to recite "base" instead of "compound" can be found, for example, in paragraph numbers [0038] and [0039]. Basis for the recitation "...soluble..." in claims 27, 28, 30, and 31 can be found, for example, in paragraph [0034]. The basis for the recitation "...hydroxide..." in claims 34-36, 40, and 41 can be found in original claim 5 for example and paragraph [0039] for example. Basis for the recitation "...direct fluid communication..." in claims 46-51 can be found, for example, in figures 2-5. Basis for the recitation "clarified" in claims 34, 37, 39, and 40 can be found in paragraph [0051], for example.

The rejection of claim 1, as it now pertains to new claim

27, under 35 USC 102(b) as anticipated by United States Patent 5,759,401 to Boussely is respectfully traversed. The Office states that Boussely describes activated sludge treatment in an aerobic tank/environment in which aerobic biological oxidation takes place under such conditions as for example by United States Patent 4,780,208 to Bohnke or by United States Patent to Barnard. In nitrification, the carbonate and ammonium buffer levels are reduced and the Office cites United States Patent 5,811,009 to Kos for support. The Office concludes in short reduction in levels of carbonate, ammonium buffers, and alkalinity is inherent in any biological nitrification process. It then states that after nitrification, Boussely adds coagulant (salts of alkaline earth metals) so that downstream recovery of phosphorus may be effected through clarification.

Applicants respectfully submit that the Boussely reference fails to anticipate the instantly claimed invention. The reference teaches treating waste water with mechanical pretreatments followed by conveying the waste water to an anaerobic tank for removal of biological phosphate. The waste water is then conveyed to an aerobic tank for biological oxidation. After this the effluent is clarified and the settled sludges are thickened and dewater to recover the biological

phosphate. Bousely uses a combination of biological phosphate removal which occurs when activated sludge microorganisms accumulate phosphorus in the form of polyphosphates when exposed to the alternation of aerobic/anaerobic conditions, and (b) by physico-chemical clarification of the phosphorus accumulated in the bacterial solid matter (activated sludge) with the use of coagulants. The function of the coagulant is to destabilize colloidal solids-particulate phosphorus in bacterial biomass, see col. 2, lines 35-38, by charge neutralization that improves clarification. This is outside the scope of the present invention which recovers soluble phosphates from wastewater having reduced levels of suspended solids. Withdrawal of the instant rejection is respectfully requested.

The rejection of claim 2, as it now applies to new claim 28, under 35 USC 103(a) as obvious over Bousely as applied above to claim 1, in view of United States Patent 5,268,105 to Uejima is respectfully traversed. The Office states that Uejima at column 2, lines 58-63 teaches that the wastewater treatment art recognizes calcium hydroxide as an alkaline earth metal salt. The Office concludes that it would have been obvious to have selected calcium hydroxide for use in the Bousely method.

Applicants respectfully submit that the combination of

Boussely in view of Uejima fails to render the instantly claimed invention *prima facie* obvious because Uejima fails to cure the deficiencies of Boussely especially since Uejima is non-analogous art. The combination of Boussely in view of Uejima fails to teach a process comprising providing wastewater having at least reduced levels of carbonate and ammonium buffers, and at least reduced levels of suspended solids to a reactor vessel, and adding an alkaline earth base to said wastewater to precipitate soluble phosphate. Boussely, as discussed above in the remarks to the rejection above, said discussion hereby incorporated by reference for the sake of brevity, teaches the use of a coagulating agent that can include an alkaline-earth metal to complete the biological removal of phosphorus-see column 2, lines 35-39, for example. Uejima is non-analogous art and the combination fails to cure the deficiencies of Boussely. Uejima teaches the use of a compound containing an alkaline earth metal salt to eliminate the bonding strength between highly absorbent polymers in human-waste disposal material and water so that the water can be removed from the material. Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the

field of the inventors endeavor, whether the reference is reasonably pertinent to the particular problem. See *In re Clay*, 23 USPQ 2d 1058 (CAFC, 1992). Uejima, as stated above, relates to removing water from highly water-absorbent polymers. The reference is not reasonably pertinent to the problem of removing soluble phosphorus from wastewater with reduced carbonate and ammonium buffers and reduced suspended solids. One of ordinary skill in the art at the time the claimed invention was made would not look to the Uejima reference for teachings for using an alkaline earth metal base in a process for treating wastewater.

The rejection is improper since the combination of references fails to render the instantly claimed invention *prima facie* obvious for the above reasons. Withdrawal of the instant rejection is respectfully requested.

The rejection of claims 1 and 2, as it now applies to new claims 27 and 28, under 35 USC 102(b) as anticipated by Barnard is respectfully traversed. The Office states that Barnard describes nitrification followed by addition of lime (CaO) to a wasted sludge stream to effect phosphate removal and directs attention to column 15.

Applicants respectfully submit that Barnard fails to anticipate the instant invention of new claims 27 and 28 because

the wasted sludge stream of Barnard would contain suspended solids-it would be turbid as evidenced by the Bohnke patent (See the abstract and column 4, lines 16-27, for example) cited in the earlier 102(b) rejection using Boussely. The instantly claimed invention requires that the wastewater has at least reduced levels of suspended solids. Therefore, the reference fails to anticipate the instantly claimed invention. Withdrawal of the instant rejection is respectfully submitted.

The rejection of claims 3-6, as it now pertains to new claims 29-32, under 35 USC 103(a) as obvious over Barnard and United States Patent 4,017,388 to Albertson. The Office states that Barnard treats the wastewater to nitrification with subsequent downstream phosphorus removal using a known technique. The Office then states that Barnard does not teach adding alkali to raise the pH before phosphorus removal to at least 9, as claimed. The Office then concludes that it would have been obvious to have increased the pH of the nitrified wastewater to at least 9 before addition of calcium hydroxide as taught by Albertson to effect improved phosphorus sludge cake dewatering as shown by Albertson citing claim 1 and the entire document.

Applicants respectfully submit that the combination of Barnard and Albertson fails to render the instantly claimed

invention *prima facie* obvious because Albertson fails to cure the deficiencies found in Barnard with respect to the instantly claimed invention. As discussed in the above rejection, the wasted sludge stream of Barnard would contain suspended solids-it would be turbid as evidenced by the Bohnke patent (See the abstract and column 4, lines 16-27, for example) cited in the earlier 102(b) rejection using Boussely. The instantly claimed invention requires that the wastewater has at least reduced levels of suspended solids. The process of the present invention produces a purified phosphorus sludge versus a dry sludge cake typically made of organic compounds in the Barnard process. The combination of Barnard and Albertson fails to cure this deficiency since Albertson teaches addition of lime to sewage sludge to more easily dewater sludge. The combination of references fails to teach one of ordinary skill in the art at the time the claimed invention was made a process using a nitrified wastewater having at least reduced levels of suspended solids and recovering the phosphate as taught by the instant specification.

The Office is using the improper standard of obvious to try. It is respectfully submitted that the essence of obviousness does not arise by merely picking and choosing from the prior art to produce the claimed invention. "In order to establish *prima*

facie obviousness it is necessary for the examiner to present evidence preferably in the form of some teaching, suggestion, incentive, or general available knowledge, that one of ordinary skill in the art would have been led to combine relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. Ex parte Levengood, 28 USPQ2d 1300, 1301 (Bd. Pat. & Int'l, 1993). Starting from this correct standard of obviousness, the error of the Office is clear-the rejection is improper because the Office has failed to identify any teachings in the prior art motivating the skilled artisan to produce the process of the presently claimed invention. No references or combination of references have been provided which would teach, suggest, or motivate one of ordinary skill in the art to modify the Barnard et al. reference and the Albertson et al. reference to treat nitrified wastewater having at least reduced levels of suspended solids with an alkali, more specifically a metallic-containing salt or hydroxide such as an alkaline earth metal-containing salt or hydroxide as recited in claim 32 to recover phosphate (claim 30), as in the instantly claimed invention. There is simply no motivation save for the teachings of the inventor's application, to produce the claimed invention. The Office is also using the improper standard of

IMPROPER hindsight analysis. It is impermissible to use the claimed invention as an instruction manual or template to piece together the teachings of the prior art so that the claimed invention is rendered obvious. One cannot use improper hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. The combination of Barnard and Albertson fails to render the instantly claimed invention *prima facie* obvious.

The rejection is improper. Withdrawal of the instant rejection is respectfully requested.

The rejection of claims 8-11 and 13-14, as it now applies to new claims 34-37 and 39-40, under 35 USC 103(a) as obvious over Barnard, Albertson and United States Patent 5,622,697 to Moore is respectfully traversed. The Office states that Barnard treats the wastewater to nitrification with subsequent downstream phosphorous removal using a known technique. The Office then adds that Barnard does not teach adding alkali to raise the pH before phosphorus removal to at least 9 as claimed. The Office concludes that it would have been obvious to have increased the pH of the nitrified wastewater to at least pH 9 before addition of calcium hydroxide as taught by Albertson to effect improved phosphorus sludge cake dewatering as by Albertson citing claim 1

and the entire document. The Office then states that Barnard does not teach controlling the N/P ratio to a desired value. The Office then states that it was widely known to apply phosphorus sludge as a soil amendment/fertilizer and that the N/P ratio is a well known and important parameter in the quality and effectiveness of fertilizers as shown by Moore. The Office further concludes that it would have been obvious to have controlled the N/P ratio to increase the value of the phosphorus sludge for subsequent use as a fertilizer.

Applicants respectfully submit the combination of Barnard, Albertson and Moore fails to render the instantly claimed invention *prima facie* obvious because Barnard and Albertson fail to teach the instantly claimed invention and Moore fails to cure the deficiencies of Barnard and Albertson. Furthermore, Moore is non-analogous art. As admitted by the Office, the Barnard reference fails to teach controlling the N/P ratio to a desired ratio. Albertson also fails to teach this in a process for removing soluble phosphorus from animal wastewater. Moore is non-analogous art since Moore teaches adding a substance to poultry litter, which is not a wastewater, to reduce the level of soluble phosphorus in order to reduce the amount of soluble phosphorus in runoff from litter-amended pastures and increase

forage yields. Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventors endeavor, whether the reference is reasonably pertinent to the particular problem. See *In re Clay*, 23 USPQ 2d 1058 (CAFC, 1992). Moore relates to decreasing soluble phosphate in poultry litter. The reference is not reasonably pertinent to the problem of removing soluble phosphorus from animal wastewater. One of ordinary skill in the art at the time the claimed invention was made would not look to the Moore reference for teachings for using producing an effluent with a predefined nitrogen:phosphorus ratio since the reference is totally silent on producing effluents.

The rejection is improper since the combination of references fails to render the instantly claimed invention *prima facie* obvious for the above reasons. Withdrawal of the instant rejection is respectfully requested.

The rejection of claims 21, 23, 24, and 25, as it now pertains to new claims 46, and 48-50, under 35 USC 102(b) as anticipated by Barnard is respectfully traversed. The Office states that Barnard describes a solid separation unit 22, an

aeration unit 20, a nitrification unit 16, and a phosphorus separation unit downstream phosphorus removal step, citing column 5, lines 25-28. The Office further states that the nitrification unit 16 is in fluid communication albeit not in direct fluid communication-with the aeration unit 20 because unit 18 does not prohibit movement of fluid from 16-20. The Office then states that solid separation unit 22 is in indirect fluid communication with nitrification unit 16 because unit 14 does not impede flow of fluid from 22 to 16 via 26,30,31,14 and per claim 24 denitrification unit is shown at 18.

Applicants respectfully submit that Barnard fails to anticipate the instantly claimed invention because the claim states that the aeration unit is in direct fluid communication with a clarified effluent from said solid separation unit and a nitrification bioreactor is in direct fluid communication with said aeration unit.

Withdrawal of the instant rejection is respectfully requested.

The rejection of claims 22 and 24, as it now pertains to new claims 47 and 49, under 35 USC 103(a) as being obvious over Barnard is respectfully traversed. The Office states that Barnard describes the solid separation step 22 as a clarification

step. The Office states that it is notoriously well known to use flocculants to improve separation between suspended solids and water in a clarification step. The Office concludes that it would have been obvious to have used flocculants in the clarification step in vessel 22 to improve clarification of the effluent water and/or reduce water of the under flowing sludge.

Applicants respectfully submit that Barnard fails to render the instantly claimed invention *prima facie* obvious because the reference fails to teach the addition of flocculants in a solid separation unit and the Office has provided no other references that teach the use of flocculants in a solid separation unit in a system for wastewater treatment especially one that is in direct fluid communication with a clarified effluent from said solid separation unit (Claims 47 and 49), and wherein the system may include a nitrification unit in direct fluid communication with an aeration unit (claim 47). The rejection is improper. Withdrawal of the instant rejection is respectfully requested.

The rejection of claims 17-20 under 35 USC 112, 2nd paragraph for failing to particularly point out and distinctly claim the subject matter for which patent protection is sought is respectfully traversed. New claim 43 no longer has a proper antecedent basis problem since claims 17 and 18 were combined to

form new claim 43 and the claim recites an aeration unit. New claim 45, corresponding to canceled claim 20 not longer depends from a method claim.

Withdrawal of the instant rejection is respectfully requested.

In view of the above amendments and remarks, it is believed that all of the claims are in condition for allowance. Accordingly, it is respectfully requested that the instant application be allowed to issue. If any issues remain to be resolved, the Examiner is invited to telephone the undersigned at the number below.

In the event this paper is deemed not timely filed, the undersigned petitions for an appropriate extension of time. Please charge any fees which may be required by this paper or at any time during prosecution of the instant application, or credit any overpayment, to deposit account 50-2134.

Respectfully Submitted

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DATE

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CERTIFICATE OF FILING VIA FACSIMILE

The undersigned hereby certifies that the attached **Amendment and Petition for a One (1) month extension of time** was this day, January 28, 2004 filed in the United States Patent and Trademark Office via facsimile to facsimile number 703-872-9306 Total Pages: 29

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